

Ohm's law and component characteristics

Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Lab answers

These model answers use the sample table. Your own values will differ because every thermistor has its own rating, but the curve should fall steeply at low temperature and flatten as the water gets hotter.

Level: Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** GCSE P2, IGCSE 4.3

Question 1 Plot the graph

A falling curve: the points form a curve that falls steeply at low temperature and flattens at high temperature, from 12.5 k Ω at 20 °C to 1.76 k Ω at 70 °C.

Question 2 Describe the pattern

Resistance **decreases** as temperature rises. A thermistor with this behaviour is an **NTC** (negative temperature coefficient) thermistor.

Question 3 Percentage change

Fall = 12.54 – 1.76 = 10.78 k Ω . Percentage = $10.78 \div 12.54 \times 100 = 86 \%$.

Question 4 Interpolate

5.0 k Ω lies between 5.30 k Ω (40 °C) and 3.59 k Ω (50 °C). Interpolating gives about **42 °C**.

Question 5 Current in a circuit

20 °C: $I = 6.0 \div 12540 = 0.48 \text{ mA}$. 70 °C: $I = 6.0 \div 1760 = 3.41 \text{ mA}$.

Question 6 Sources of error

Temperature differs between the water and the thermistor because the glass delays the heat (thermal lag), and the thermometer is read only to 1 °C. The thermistor leads also add a **small resistance**.

Question 7 Improvement

Stir continuously and wait longer at each step so the thermistor reaches the water temperature; use a digital thermometer and **repeat the cooling run** to average the readings.